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IDENTIFIERS	*Power Line Technicians

ABSTRACT

This module is the first in a series that is designed to help students achieve greater professional and personal success as power line technicians. Each module represents one or more complete units of instruction with components organized into one instructor and one student "package": the instructor's manual and the student workbook. The instructor's manual begins with a profile of training mastery that lists the competencies covered in the curriculum and provides space for recording information about the student's mastery of each objective. Other introductory matter includes information on use of the manual, recommendations for measuring student performance gains, and required criteria for a competency-based education program. The instructor's manual also contains one set per unit of these components: suggested activities, answers to assignment sheets, answers to test, transparency masters, and test. The student workbook contains one set per unit of most or all of these components: objective sheet, information sheets, assignment sheets, and job sheets. The four units in this module are as follows: (1) orientation to rural electric cooperatives, (2) introduction to power line technician's training, (3) job advancement, and (4) general safety. Most units are designed for use in more than one lesson or class period. (YLB)

ED 403 410

Power Line Technician
Second Edition

Module A

Instructor's Manual
Student Workbook

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Power Line Technician

Second Edition

Module A

- Orientation to REC
- Introduction to Power Line Technician's Training
- Job Advancement
- General Safety

CIMC

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Instructor's Manual

97-012241

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1500 West Seventh Avenu
Stillwater, OK 74074-436
http://genesis.okcte.state.ok.us/cimc/home.htm
TI101

3

POWER LINE TECHNICIAN
PROFILE OF TRAINING MASTERY

Instructor _____ Date _____

Program _____

Grade _____ School _____

Name _____ Soc. Sec. No. _____

Address _____ Phone _____

In Case of Emergency, Contact _____

Address _____ Phone _____

Allergies/Disabilities that might require special accommodation for training (please specify) _____

The above information can be used for school records and/or to ensure safety of students. This confidential information is not to be released to employers or the general public.

Date of Enrollment ___-___-___ Total Class Hours _____ Total Hours Absent _____

Date of Withdrawal ___-___-___ Total On-the-Job Training Hours _____ Total Hours Tardy _____

Date of Completion ___-___-___ Total Lab Hours _____

ON-THE-JOB TRAINING/WORK EXPERIENCE

Duration of Employment _____ Job Title _____ Supervisor's Name _____

Address of Employer _____ Phone _____

Duration of Employment _____ Job Title _____ Supervisor's Name _____

Address of Employer _____ Phone _____

Use of This Document

This document can be used to record information about the student and skills mastered. This information is useful in documenting student progress during training and in providing information about the student's qualifications to potential employers and/or for entry into advanced training programs. Instructors using these materials are authorized to reproduce this document as required for use in their training programs.

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SPECIFIC JOB COMPETENCIES

Instructor: As each competency is mastered, place your initials and the date in the blank on the left. This will verify that the student can perform the skill with a minimum of supervision.

MODULE A

Date/Initial

Unit 1 – Orientation to REC

1. Match terms associated with REC orientation to the correct definitions.
2. State the reason for establishing the Rural Electrification Administration.
3. Discuss the importance of rural electric cooperatives.
4. Describe the benefits of rural electric cooperatives to rural America.
5. Select from a list the finance agencies which loan money to rural electric cooperatives.
6. List types of electric utilities.
7. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – Introduction to Power Line Technician's Training

1. List responsibilities of a line technician to the community.
2. Select from a list the responsibilities of a line technician to the employer.
3. Select from a list information that is shown on an organizational chart.
4. List departmental functions of a line department.
5. Select from a list topics taught in this course.
6. List benefits to students who complete the line technician's training course.
7. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 3 – Job Advancement

1. Match terms associated with job advancement to the correct definitions.
2. List characteristics employers consider when making promotions.
3. Distinguish between good and poor work attitudes.
4. List steps that will help in job advancement.
5. Select from a list benefits of additional education and training.
6. Discuss activities that will better prepare a person for advancement.
7. Discuss reasons people do not succeed on the job.
8. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – General Safety

1. State the safety responsibilities of an REC employee.
2. List the steps of discipline for safety rule violations.
3. Select from a list items which are subject to safety rules.
4. State reasons for the importance of a safety policy.
5. Discuss OSHA regulations for first aid.
6. List the basic steps in first aid.
7. List steps of basic life support.
8. List first aid supplies.
9. List the practices for care of first aid supplies.
10. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

MODULE B

Date/Initial

Unit 1 – Personal and Job Safety

1. Match terms associated with personal and job safety to the correct definitions.
2. Describe the procedures to follow for various types of rescue situations.
3. List components necessary for fire.
4. Match classes of fires to the correct description of each.
5. Match types of fire extinguisher to the class or classes of fire each is best suited to extinguish.
6. List general safety precautions to observe during rescue.
7. Discuss in a short paragraph driving skills needed by a line technician.
8. List some poor attitudes that may cause accidents.
9. Select from a list requirements of a skilled driver.
10. List steps of defensive driving.
11. Identify shapes of traffic signs.
12. Select from a list some general safety precautions to observe when operating equipment.
13. State OSHA/DOT regulations for inspection of equipment.
14. Select from a list the items which should be inspected daily on mechanical equipment.
15. List methods for maintaining a clean and orderly work area.
16. Explain how to lift heavy objects.
17. Describe in a short paragraph the importance of safety communications.
18. Select from a list those items of importance that should be reported to the supervisor.
19. Select from a list items related to safety that a line technician should know concerning location and voltage.
20. State factors which determine the maximum weight which can be lifted by equipment.
21. Determine maximum weight that can be lifted by equipment at various angles.
22. Complete a safety pledge form.
23. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – Communications

1. List types of communications necessary for an REC employee.
2. Select from a list those items of communication that are important between fellow workers.
3. List items of communication that are important between the worker and the supervisor.
4. Select from a list those items of communication that are important between the worker and the general public.
5. Identify hoist signals.
6. Identify winch line signals.
7. Identify hand signals used in boom operations.
8. Identify hand signals used when maneuvering vehicles.
9. Identify line work signals.
10. Select from a list the proper radio procedures.
11. State emergency radio procedure.
12. Select from a list the prohibited uses of the radio.
13. Match radio code signal numbers to the correct meanings.
14. List factors that are important when using cellular mobile telephones.
15. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Student ratings on specific competencies evaluated during the course are available upon student's written request and/or by calling the instructor. Parent's or guardian's signature is necessary if student is under 18 years of age.

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Date/Initial

Unit 3 – Basic Electrical Theory

1. Match terms associated with basic electrical theory to the correct definitions.
2. List uses of electricity.
3. Discuss the electron theory.
4. Distinguish between alternating and direct current.
5. Match types of magnets to the correct descriptions.
6. State the law of magnetic poles.
7. Describe magnetic force as it relates to production of electricity.
8. Select from a list characteristics of electromagnetic force.
9. Explain the generation of electricity using magnets.
10. Describe electromagnetic induction.
11. Identify types of circuits.
12. Identify conditions of circuits.
13. Name sources of alternating and direct current.
14. Identify divisions of an electrical system.
15. State the relationship among amperage, resistance, and voltage.
16. Solve problems using Ohm's law.
17. Calculate for an unknown voltage.
18. Calculate for an unknown amperage.
19. Calculate for an unknown resistance.
20. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – Rope and Rigging

1. Match terms associated with rope and rigging to the correct definitions.
2. Identify parts of a stationary block.
3. List kinds of rope used in line work.
4. Determine the tensile strength of various kinds and sizes of rope.
5. Determine the mechanical advantage of using block and tackle.
6. List uses of various types of rope gear.
7. Apply the formula necessary for the safe working load of various kinds and sizes of ropes when given the tensile strength and safety factory.
8. Identify various knots and hitches.
9. Match various knots and hitches with the correct uses.
10. Identify elements of knots, bends, and hitches.
11. List conditions that damage rope.
12. Calculate the mechanical advantage of using block and tackle.
13. Calculate working load of various ropes.
14. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 5 – Overhead Construction

1. Match terms associated with overhead construction to the correct definitions.
2. Match materials commonly used in overhead construction to their specific uses.
3. Identify hand tools commonly used in overhead construction.
4. Match hand tools to their specific uses.
5. Identify overhead construction tools.
6. Match overhead construction tools to their specific uses.
7. List elements of overhead construction.
8. List equipment used in overhead construction.
9. Match equipment commonly used in overhead construction to their specific uses.
10. Select from a chart the correct depth to set poles of varying lengths.
11. List methods used to properly sag conductors.
12. Identify various types of connectors used in overhead construction.
13. Match types of construction to the correct descriptions.
14. List steps to properly install a pole key.
15. State correct procedure for installing a ground rod.
16. Arrange in order the steps to follow when framing a pole.
17. Identify various structures used in transmission line construction.
18. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 6 – Underground Distribution Construction

1. Match terms associated with underground construction to the correct definitions.
2. Identify equipment used in underground construction.
3. Match various types of equipment to the specific uses.
4. List general requirements for underground construction.
5. Arrange in order the correct procedure for installing cable.
6. List precautions to observe when handling underground cable.
7. Select from a list methods of marking cable for identification.
8. List methods used to locate and identify a utility ditch.
9. Identify equipment used to terminate primary cable on a pole.
10. State the requirement for grounding underground equipment.
11. List hazards which may be encountered in underground construction.
12. List precautions to observe when splicing or terminating cable.
13. Select from a list the tools used in underground construction.
14. Make a proper splice in secondary cable.
15. Make a proper splice in primary cable.
16. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 7 – Personal Climbing Tools and Equipment

1. Match terms associated to personal climbing tools and equipment to the correct definitions.
2. Identify personal climbing tools and equipment.
3. Match tools and equipment to the specific use.
4. List conditions to watch for when inspecting personal climbing tools and equipment.
5. Name types of maintenance for personal climbing tools and equipment.
6. List safety precautions to observe when climbing poles.
7. Select from a list the general procedure for climbing poles.
8. Name rules for safe and proper storage of personal tools and equipment.
9. Climb poles.
10. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 8 – Right-Of-Way

1. Match terms associated with right-of-way clearing and control to the correct definitions.
2. List methods to maintain good public relations.
3. Identify tools used for right-of-way clearing and control.
4. State the purposes of right-of-way control.
5. Select from a list the safe working procedures for right-of-way clearing and control.
6. Select proper methods of tree trimming.
7. List steps to remove limb hanging over an energized conductor.
8. List steps to fell a tree.
9. State the specifications for clearing right-of-way for distribution line.
10. List types of clearing and chemical control for right-of-way.
11. Identify various trees that grow rapidly.
12. Identify poisonous vegetation.
13. Draw cuts needed to remove heavy limbs.
14. Draw procedure for removing limb hanging over energized conductor.
15. Draw procedure for felling a tree.
16. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

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Date/Initial

Unit 9 – Distribution Transformers

1. Match terms associated with transformers to the correct definitions.
2. State the functions of a transformer.
3. Identify parts of a completely protected transformer.
4. Distinguish between additive and subtractive polarity as they relate to transformers.
5. List kinds of transformers.
6. Match types of transformers to the correct descriptions.
7. Classify types of transformers as oil-cooled or air-cooled.
8. Discuss technical considerations in protective grounding and jumpering.
9. List information found on a transformer nameplate.
10. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

MODULE C

Date/Initial

Unit 1 – Poles

1. Match terms associated with poles to the correct definitions.
2. List five types of preservatives used on poles.
3. Match the type of preservatives used on poles with their code letters.
4. Select from a table the classes of poles of varying lengths and circumferences.
5. Select from a list precautions to observe when handling poles.
6. Calculate the weights of various classes and lengths of commonly used poles using a table.
7. List methods used to set poles.
8. State the correct procedure for checking a pole before climbing.
9. Arrange in proper order the steps for pole inspection.
10. List methods used to support unsafe poles for climbing.
11. State the correct method for storing poles.
12. Select from a table the classes of poles of varying lengths and circumferences.
13. Calculate the weights of various classes and lengths of commonly used poles using a table.
14. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – Conductors

1. Match terms associated with line conductors to the correct definitions.
2. List methods used to protect line conductor at supports.
3. Arrange in order the steps to follow when joining ACSR conductors.
4. Arrange in order the steps to follow when joining CWC conductors.
5. List classes of conductors.
6. List methods of reeling our conductor.
7. Identify various types of conductor ties.
8. Match types of conductors to their specific use.
9. State conductor clearance from ground, roofs and building walls for conductors carrying 750 volts or less.
10. State conductor clearance from ground for conductors carrying over 750 volts to 22,000 volts.
11. Match current-carrying capacities of various ACSR conductors to the correct conductor size.
12. Match current-carrying capacities of various copperweld copper conductors to the correct conductor size.
13. Install a preformed line tie on ACSR conductor on a de-energized circuit.
14. Install a top groove conductor tie on a de-energized copper conductor.
15. Install a preformed armor rod on ACSR conductor.
16. Join ACSR conductor.
17. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 3 – Grounding and Connecting

1. Match terms associated with grounds and connectors to the correct definitions.
2. State the purposes of grounding.
3. List methods of grounding.
4. Select from a list those elements necessary for good grounding.
5. Select from a list equipment which must be grounded.
6. State the correct procedure for installing temporary protective grounds.
7. Arrange in order the steps to follow when disconnecting and grounding at sectionalizer or recloser station.
8. Arrange in order the steps to follow when disconnecting and grounding at multiphase vertical corner.
9. State the procedure for installing temporary protective grounds at air-break switch on a transmission line.
10. List elements of a good connection.
11. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – Generators and Batteries

1. Match terms associated with generators and batteries to the correct definitions.
2. List kinds of generating plants.
3. Match kinds of generators to the voltages produced by each.
4. Match kinds of generators to the specific uses.
5. Calculate the frequency (Hertz) of various generators.
6. List precautions to observe with the use of portable generators.
7. List types and kinds of voltage-producing cells.
8. Identify various circuits of connected batteries.
9. Select from a list precautions to observe when connecting batteries.
10. Arrange in order the steps to follow to connect lead-acid batteries when starting equipment.
11. Connect batteries in series and parallel.
12. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 5 – Work Procedures (Nonenergized)

1. Match terms associated with work procedures to the correct definitions.
2. Select from a list information found on a staking sheet.
3. Arrange in proper order the procedure for line construction.
4. List steps to follow when installing service wire.
5. State the procedure for connecting service wire.
6. Match the materials needed to construct primary and neutral assemblies using ACSR conductor 7.2kV construction.
7. List materials needed to install various pole ground assemblies.
8. List materials needed for various primary assemblies.
9. List materials needed to complete a work order.
10. Identify section numbers within a township.
11. Locate rural property in Oklahoma using legal descriptions.
12. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

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MODULE D

Date/Initial

Unit 1 – Insulation

1. Match terms commonly associated with insulators and insulation to their correct definitions.
2. List steps to follow when installing a pin type insulator.
3. Select from a list methods of insulating distribution voltages.
4. Select from a list methods of insulating various transmission voltages on wooden structures.
5. Match insulative materials to their specific uses.
6. Select from a list precautions to observe with insulators and insulation.
7. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – Substations

1. Match terms commonly used with substations to the correct definitions.
2. State functions of a substation.
3. Identify components of a substation.
4. Match components of a substation to their specific use.
5. Arrange in order the steps for taking a substation out of service.
6. Select from a list precautions to observe with a substation.
7. Arrange in order the correct procedure for changing a substation oil circuit recloser.
8. State the correct procedure for bypassing a substation current transformer.
9. List indications in a substation that could cause an outage.
10. Match indications to problems which may occur in substations.
11. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 3 – Ground and Jumpers (Line Equipment)

1. Match terms commonly used with grounds and jumpers to the correct definitions.
2. Match types of jumpers to their specific use.
3. State requirements for various jumpers.
4. Select from a list the line equipment that is connected by jumpers.
5. Match types of jumpers to the correct installation methods.
6. State the requirements for safe grounding of line equipment.
7. Distinguish between proper and improper grounding methods.
8. Calculate current flow of faulted equipment which is improperly grounded.
9. Calculate voltage on improperly grounded faulted equipment.
10. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – Voltage and Current Measuring

1. Match terms commonly used with voltage and current measurements to the correct definitions.
2. State the purposes of voltage and current measurements.
3. Identify equipment used for voltage and current measurements.
4. State the correct procedure for determining voltage drop of a service.
5. State the correct procedure for determining current demand on a primary circuit in a specific area.
6. State procedures for determining current demand on a transformer.
7. List steps to obtain primary line voltage drop.
8. Select from a list reasons for current measurements.
9. Match full load secondary current at 240 volts single phase to the kVA ratings of a transformer.
10. Select from a list precautions to observe when making voltage and current measurements.
11. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

MODULE E

Date/Initial

Unit 1 – Meters and Meter Application

1. Match terms commonly associated with metering to the correct definitions.
2. List general types of meters.
3. List types of meters by base construction.
4. List classes of meters and the current-carrying capacity of each.
5. Match meters to types of service.
6. Match meter to voltage ratings to types of service.
7. Match abbreviations and symbols used with metering circuit diagrams to the correct meanings.
8. List uses of current transformer metering.
9. List uses of self-contained meter connections.
10. Identify various self-contained meter connections.
11. Identify various transformer-rated meter connections.
12. Identify various transformer-rated meter connections for 600 volts or above.
13. State the procedure for selecting the correct meter.
14. List methods for determining voltage for wye and delta connected meters.
15. Match types of services to specific uses.
16. List types of meters which have multipliers.
17. Arrange in order the correct procedure for determining meter mutipliers.
18. List precautions to observe with metering.
19. Calculate the multiplier for a transformer-rated meter connected to a secondary line.
20. Calculate the multiplier for a transformer-rated meter connected to a primary line.
21. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – System Knowledge

1. Match terms used with system knowledge to the correct definitions.
2. Define symbols used with overhead lines and equipment identification on system maps.
3. Define symbols used with underground lines and equipment identification on system maps.
4. Identify symbols used to locate cultural features on system maps.
5. List functions of automated equipment.
6. List precautions to observe with automated equipment.
7. Select from a list conditions associated with system terrain.
8. Identify symbols on a system map.
9. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

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Date/Initial

Unit 3 – Transformer Connections and Banking

1. Match terms commonly used with transformer connections and banking to the correct definitions.
2. Define characteristics of transformer construction.
3. Match symbols used with transformer voltage rating and connection diagrams to the correct meanings.
4. Discuss transformer polarities.
5. Discuss bushing locations in relationship to polarity on padmount transformers and compare to pole-type in regard to subtractive and additive.
6. Identify secondary coil connections for two- and three-wire service.
7. Identify single-transformer connections for three-wire service.
8. Identify two-transformer banks.
9. Define objectives an electrician must keep in mind when constructing three-phase banks.
10. List in order the step-by-step process for designing three-phase banks.
11. Describe phase relationships between the bushings in three-phase banks.
12. Identify types of primary and secondary connections for three-transformer banks.
13. List precautions to observe when selecting transformers to be banked or paralleled.
14. Identify secondary connections on a four-bushing transformer.
15. State the correct method of connecting wye and delta transformers to a primary line.
16. Arrange in order the steps to find a faulted transformer in a bank.
17. State the precautions to observe with transformer banks.
18. Connect transformer secondary coils in series and parallel.
19. Connect a wye-delta bank for three-phase four-wire 120/240-volt service.
20. Connect a wye-delta bank for three-phase three-wire 240-volt service.
21. Connect a wye-wye bank for three-phase four-wire 120/208-volt service.
22. Connect an open-wye open-delta bank for three-phase four-wire 120/240-volt service.
23. Connect an open-wye open-delta bank for three-phase three-wire 240-volt service.
24. Connect an open-delta open-delta bank for three-phase four-wire 120/240-volt service.
25. Connect two single-bushing transformers in parallel.
26. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – Phasing

1. Match the terms commonly associated with phasing to the correct definitions.
2. List elements of phasing.
3. State methods of determining phase rotation.
4. State the procedure for changing the direction of rotation of a three-phase motor.
5. Arrange in order the steps to follow when phasing circuits with a phasing meter.
6. Arrange in order the steps to follow to identify distribution phases.
7. Label substation distribution phases.
8. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

MODULE F

Date/Initial

Unit 1 – Line Patrol

1. Match types of line patrol to the specific purpose.
2. Select from a list items to observe when patrolling line.
3. Match items to the specific conditions to observe when patrolling a line.
4. List methods of line patrol.
5. Select from a list requirements of a line patroller.
6. List items to observe with line equipment.
7. Complete a line inspection form.
8. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – Electrical Equipment

1. Match terms used with electrical equipment to the correct definitions.
2. Match electrical equipment to the specific uses.
3. Arrange in order the steps to follow when connecting a voltage regulator to a three-phase line.
4. Arrange in order the steps to follow when placing a voltage regulator in service.
5. State the procedure for setting voltage regulator time delays.
6. State the procedure for taking a voltage regulator out of service.
7. List precautions to observe with voltage regulators.
8. List precautions to observe with capacitors.
9. Select from a list the benefits of capacitor application.
10. Name equipment that should be protected by lightning arresters.
11. Explain the method of coordinating reclosers with other reclosers.
12. List precautions to observe when installing sectionalizers.
13. Select from a list factors to consider when coordinating reclosers and fuses.
14. Connect voltage regulators to a three-phase line.
15. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 3 – Work Procedures (Hot Line, Basket, Hot Stick)

1. List methods of hot line maintenance.
2. Select from a list OSHA requirements for aerial devices.
3. Select from a list rules to observe when working with aerial devices.
4. List elements of hot line maintenance.
5. State the procedure for hot line maintenance from an aerial device.
6. Arrange in order the steps to follow when changing a pole top insulator from a basket.
7. Match various hot line tools to their specific uses.
8. Install a wire tong saddle.
9. Change an insulator on an energized conductor using hot line tools on an A1 structure.
10. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 4 – Troubleshooting (Secondary)

1. Match terms associated with troubleshooting to the correct definitions.
2. Match indications of malfunctions to the possible causes.
3. Arrange in order the correct procedure for troubleshooting electrical equipment.
4. List precautions to observe when troubleshooting electrical equipment.
5. Select from a list items of information to obtain while troubleshooting.
6. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

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MODULE G

Date/Initial

Unit 1 – Troubleshooting (Primary Line)

1. Match troubleshooting problems to possible causes.
2. Arrange in order the troubleshooting procedures to follow for various problems.
3. List precautions to observe when troubleshooting primary lines.
4. Arrange in order the steps for troubleshooting a primary line outage.
5. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 2 – System Knowledge

1. List problems associated with line switching.
2. Arrange in order the steps to follow when switching line.
3. List factors involved in line switching.
4. Select from a list precautions to observe with line voltage regulators on a switched line.
5. List precautions to observe when opening a line switch.
6. Select from a list areas and locations of importance to the line technician.
7. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

Date/Initial

Unit 3 – Conversions

1. List types of conversions.
2. Arrange in order the steps to convert a primary line to a higher voltage.
3. Arrange in order the steps to change a substation feed area to a higher voltage.
4. Explain benefits of converting to a higher voltage.
5. Select from a list precautions to observe with autotransformers.
6. Arrange in order the steps to convert a single-phase line to V-phase.
7. Arrange in order the steps to convert a single-phase line to three-phase.
8. _____

Pretest Score (%) _____

Post Test Score (%) _____

Modified Gains Score (%) _____

BEST COPY AVAILABLE

Power Line Technician: Module A

Instructor's Manual

Upfront

Suggested Activities

Answers to Assignment Sheets

Answers to Test

Transparency Masters

Test

Developed by the
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education

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Curriculum and Instructional Materials Center

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Instructor's Manual

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One set per unit of the following components:

- Suggested Activities
- Answers to Assignment Sheets
- Answers to Test
- Transparency Masters
- Test

Student Workbook

One set per unit of Objective Sheets, Information Sheets, Assignment Sheets, and Job Sheets for each of the units in this module:

MODULE A

1. Orientation to REC
2. Introduction to Power Line Technician's Training
3. Job Advancement
4. General Safety

MODULE B

1. Personal and Job Safety
2. Communications
3. Basic Electrical Theory
4. Rope and Rigging
5. Overhead Construction
6. Underground Distribution Construction
7. Personal Climbing Tools and Equipment
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9. Distribution Transformers

MODULE C

1. Poles
2. Conductors
3. Grounding and Connecting
4. Generators and Batteries

5. Work Procedures (Nonenergized)

MODULE D

1. Insulation
2. Substations
3. Grounds and Jumpers (Line Equipment)
4. Voltage and Current Measuring

MODULE E

1. Meters and Meter Application
2. System Knowledge
3. Transformer Connections and Banking
4. Phasing

MODULE F

1. Line Patrol
2. Electrical Equipment
3. Work Procedures (Hot Line, Basket, Hot Stick)
4. Troubleshooting (Secondary)

MODULE G

1. Troubleshooting (Primary Line)
2. System Knowledge (Phase II)
3. Conversions

FOREWORD

The *Power Line Technician* series is designed to help students achieve greater professional and personal success. As a tool for building a rewarding career, this series will help students develop their professional competence. In addition, the series provides a foundation for career advancement. The *Power Line Technician* series consists of seven modules which address specific skill areas. Each module represents one or more complete units of instruction with components organized into one student and one instructor "package": the *Student Workbook*, and the *Instructor's Manual*. We believe the format and packaging will facilitate both the delivery and mastery of the identified competencies.

We hope that this series will enhance instruction and contribute to rewarding learning experiences for all students.

Roy Peters, Jr.
State Director
Oklahoma Department of
Vocational and Technical Education

Ivan Armstrong
State Supervisor
Trade and Industrial Education

ACKNOWLEDGMENTS

The Curriculum and Instructional Materials Center (CIMC) extends its appreciation to the individuals who played key roles in the development of this publication. Such a comprehensive effort requires contributions from many people. We sincerely appreciate the support necessary to complete this project.

Design: Special thanks are extended to the representatives from industry, teaching, and vocational education who participated as members of the curriculum advisory committees for the *Power Line Technician* series. We also thank the administrators, supervisors, and others who supported their participation. Significant contributions were made during the revision process by participants from ABB Power T&D Company Inc., the Association of Missouri Electric Cooperatives, the Central Rural Electric Cooperative (Stillwater, Oklahoma) and the City of Stillwater.

Development: The modules in this series were edited by Craig Maile and Dr. Lois Sharpton. Individual modules were formatted by Vonda Gile. Brenna Tillman, Publications Supervisor in the CIMC, assisted in adapting the packaging.

Production: The close cooperation and dedication of professionals at the Oklahoma Department of Vocational and Technical Education were instrumental in producing the *Power Line Technician* series. Unit and cover artwork were designed by the Art Department, under the direction of Bob Davis, Art Manager. This series could not have been printed without the expertise and commitment of the Printing Plant Staff, under the direction of Danny Darrow. Delivering the final product was accomplished through the excellence of the CIMC Customer Service staff and the staff of the CIMC Warehouse, under the direction of Darrell Stiles.

Support: A number of people at the CIMC helped to make this series possible. Terri Tomson efficiently handled the development contracts, committee meetings, and correspondence relating to this series. This project also received generous support from John Friedemann, CIMC Team Leader, and Dr. Lynna Ausburn, Development Coordinator.

Project Management: Dr. Marilyn Troupe and Craig Maile

USE OF THIS PUBLICATION

Each unit of instruction is based on the performance needed for successful employment in an occupational area. A complete unit will contain most or all of the following components: Objective Sheet, Suggested Activities, Information Sheet, Assignment Sheet, Job Sheet, Test, Answers to Assignment Sheets, Answers to Test, and Transparency Masters. These components are organized within two packages, as follows:

Instructor's Manual

- Upfront pages
- One set per unit of:
  - Suggested Activities
  - Answers to Assignment Sheets
  - Answers to Test
  - Transparency Masters
  - Test

Student Workbook

- Objective Sheets
- Information Sheets
- Assignment Sheets
- Job Sheets

Instructor's materials include the *Instructor's Manual* and the *Student Workbook*.

Unit components are tied to measurable and observable learning outcomes. Instructors are encouraged to supplement unit components with other resources to make units as responsive to local conditions and student needs as possible.

Most units of instruction are designed for use in more than one lesson or class period. Instructors should determine the following for each unit:

- amount of material that can be covered in each class period;
- skills that must be demonstrated;
- supplies and equipment needed;
- amount of class time needed for demonstrations;
- amount of class time needed for student practice;
- supplementary materials to be ordered; and
- resource persons who must be contacted.

Objective Sheet (Student Workbook)

The Objective Sheet summarizes each unit for the student and the instructor. The Objective Sheet includes the following sections:

> **Unit Objective** – The Unit Objective states the overall goal of the unit. It identifies what the student will be able to do after successfully completing the unit, as well as the standards used to measure student performance.
>
> **Specific Objectives** – The Specific Objectives outline the teaching sequence of the competencies required to reach the Unit Objective.

The Specific Objectives on the Objective Sheet should be emphasized to all students at the start of each unit and throughout the teaching/learning process. This will help answer student questions about performance requirements for each unit. Specific Objectives can also assist instructors in determining teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective could best be taught.

Instructors should modify, delete, or add objectives to meet the needs of students and the community. When objectives are added, the instructor should remember to provide the needed information, Assignment and/or Job Sheets, and criterion-referenced test items to cover the new objectives.

Information Sheet (Student Workbook)

The Information Sheet provides the "must know" content essential for meeting the cognitive objectives in the unit. The Information Sheet may include clarifying NOTES and EXAMPLES, as needed. Students should read the Information Sheet for each unit before it is discussed in class.

Assignment Sheets (Student Workbook)

The Assignment Sheets address the learning levels at or above the application level of Bloom's taxonomy. They allow students to perform non-psychomotor activities related to occupational tasks. Assignment Sheets also provide students with an opportunity to use higher-order thinking skills, such as problem-solving, synthesizing, analyzing, and evaluating. In addition, they may provide opportunities for cooperative learning and more detailed oral/written communication activities.

Job Sheets (Student Workbook)

Job Sheets give students step-by-step procedures for performing manipulative or psychomotor occupational tasks or jobs. The Job Sheet also facilitates the instructor's evaluation of each student's performance. Both the process and the end-product are evaluated. Diagrams, illustrations, and photographs are included, as needed, to assist students in completing the job.

The instructor should demonstrate the procedure outlined in each Job Sheet. Instructors may also have to localize specific procedures.

Suggested Activities (Instructor's Manual)

Instructors should study the Suggested Activities before introducing the unit, allowing enough time to obtain supplemental materials, prepare audiovisual materials, and contact outside resource persons. Specific tasks of the instructor will vary with each unit.

Answers to Assignment Sheets and Answers to Test (Instructor's Manual)

These components list the answers to all of the Assignment Sheets and the Test questions.

Transparency Masters (Instructor's Manual)

Transparency Masters are provided so that instructors can make transparencies to accompany specific units. Transparencies allow students to *see* as well as hear the information being presented, thus reinforcing the learning process. They also direct attention to the topic under discussion. Transparencies should be left on the screen only when the related topics are under discussion.

Test (Instructor's Manual)

The Test provides criterion-referenced evaluation of the Specific Objectives from the Information Sheet (Assignment Sheet and Job Sheet objectives are not evaluated by the Test). If instructors have added, deleted, or modified any objectives, appropriate changes should be made to the Test as well.

The Test serves as both a pretest and a posttest. In order to measure and document student competency gains as required by the latest Carl Perkins regulations, and as outlined in the Oklahoma-developed system of standards and measures, it is *essential* that the same test be used as a pretest and as a posttest. If instructors choose to use tests other than the unit Test, they should make sure that the same instrument is used for each activity – pre- and posttest.

A detailed explanation of the Oklahoma plan for standards and measures and the Carl Perkins requirements is included in the CIMC publication *Measuring Learning & Competency Gains: The Pretest/Posttest Approach*. This booklet – and accompanying software to assist in calculating and recording student gains – are available to Oklahoma instructors through their school's vocational testing liaison.

Profile of Training Mastery

The Profile of Training Mastery documents student performance. Each profile lists the competencies covered in the curriculum, and provides space for recording information about the student and the student's mastery of each objective. Space is also provided for recording pre- and posttest scores, modified gains, and instructor comments. A blank Profile of Training Mastery is available for this series. It may be reproduced for each student.

Page Numbering

Each Module is identified with a letter (A - G). Each unit and page has a number, shown in Arabic numerals. For example, the page number for Module A, Unit 2, page 3 of the *Student Workbook* would appear as follows:

PLT A - 2 - 3

Methods of Disseminating Material

For best results, provide each student with a copy of the Student Workbook. Students should be allowed to keep their Workbooks at the end of the course or training program.

Teaching Methods

Keeping students motivated is a challenge. Supplement each unit with current information, personal experiences, and other information. In a group setting, prepare for each unit by determining the best way to teach each objective, and allow for student input. For individualized instruction, provide opportunities for the student to become involved in planning and being responsible for his or her own education.

MEASURING STUDENT PERFORMANCE GAINS

Each CIMC unit contains only a single unit Test. This test should be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. Detailed information regarding performance gains analysis is contained in the CIMC publication, *Measuring Learning & Competency Gains: The Pretest/Posttest Approach*. In addition, the CIMC has developed a computer program, CARL, which will perform all necessary calculations and will print out a record form of all information required for gain score analysis. Copies of CARL and the publication are available through your local testing liaison (in Oklahoma), or from the CIMC at 1-800-654-4502.

REQUIRED CRITERIA FOR A COMPETENCY-BASED EDUCATION PROGRAM

Criterion	Discussion	CIMC component meeting criterion
1. Instruction is based on clearly-stated learning objectives that are: a) observable and measurable, and b) communicated in writing to students before instruction begins.	Learning objectives drive CBE. Objectives are the "competencies" that learners must achieve. Each objective must clearly state what *learners* must *do* to demonstrate acquired skill or knowledge. Verbs in learning objectives are active and precise, stating the exact performance expected of learners. The objectives should also specify the standard or level of performance required. Objectives can be at any level of Bloom's Taxonomy and can include the cognitive, psychomotor, and affective domains. Higher-order cognitive skills should be included.	Objective Sheet
2. Instruction is aligned with the stated learning objectives.	In CBE, the objectives specify what is taught. "Content" should relate to one or more objectives. The curriculum should cover all objectives with relevant information.	Information Sheet
3. There is a student evaluation system that is: a) criterion-referenced, and b) aligned to the learning objectives and the curriculum.	In CBE, the aim is to bring the performance of *all* learners up to a pre-defined standards and competencies. Learners work on each competency until they achieve "mastery"; the evaluation system should test and record this mastery. Learners can restudy and retest as often as needed. Specific remediation activities should also be available to learners when needed. The evaluation system focuses on what each student has achieved, not on what the instructor has "taught." The "constant" in CBE is student performance; the "variables" are time and resources. (This differs from traditional systems where learners get one chance at mastery; some succeed and some fail. In such systems, time and resources are constant and student achievement is variable.) If an evaluation is criterion-referenced, successful learner performance is defined by (or *referenced* to) mastery of pre-set objectives and standards (or *criteria*): there must be a careful match (or *alignment*) between what the student should master (objectives), what is taught (curriculum), and what is tested. Objectives, curriculum, and evaluation system must all match.	Test and Job Sheet

Criterion	Discussion	CIMC component meeting criterion
4. There is an observable management system of cognitive skill practice that provides for, promotes, and documents mastery learning.	For both cognitive and psychomotor skills, a CBE program must have a system of maintaining records of which skills and activities each learner has completed, which ones are in progress, and which ones have not yet been completed. Completion means "mastery"; no skill is completed until the learner has achieved the mastery level. The record system should promote feedback on student skill attainment to *both* instructor and learners, provide for remediation as needed, and encourage reevaluation of learner performance until mastery is achieved. Appropriate remediation strategies often should consider learning styles and other individual differences among learners. Learners should work on skills and activities until they achieve mastery. They should not be "passed on" without mastery. While learners may move ahead and work on other skills (i.e those for which all prerequisite skills have been mastered or those without prerequisites), work should also continue on the skills still requiring mastery. Students should not attempt higher-order skills until all prerequisite skills are mastered.	Assignment Sheet
5. There is an observable management system of psychomotor skill practice that provides for, promotes, and documents mastery learning.		Job Sheet
6. Skill mastery records are maintained for each learner, and learners have access to and make use of these records to monitor their skill acquisition.	Records should clearly indicate the skills each learner has mastered. One such record should profile or list the competencies that have been mastered and those to be mastered. Other performance indicators can be added and kept in a portfolio for each learner. Learners should have ready access to their portfolios to monitor their own progress in skill mastery and competency attainment.	Profile of Training Mastery

CORRECTIONS AND SUGGESTIONS

The Curriculum and Instructional Materials Center (CIMC) wants to provide vocational instructors and students with accurate and effective materials. Although the CIMC strives to maintain the highest standards of development and production, oversights sometimes do occur. If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. To do this, please identify the page(s) affected and write any comments to clarify the error or suggestion. Use the spaces below. Then, simply fold (bottom of page *upward*, top *downward*), secure, and mail.

This information will be used to correct the publication before the materials are reprinted. To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error.

[2] Fold downward

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ORIENTATION TO REC
UNIT 1

SUGGESTED ACTIVITIES

1. Suggested activities for instructor:

   - Provide student with objective sheet.
   - Provide student with information sheet.
   - Discuss unit and specific objectives.
   - Discuss information sheet.
   - Give test.

2. Unit references:

   - *Power Line Technician.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1978.

ORIENTATION TO REC
UNIT 1

ANSWERS TO TEST

1. a. 2 d. 1
   b. 3 e. 6
   c. 4 f. 5

2. To assist rural Americans in acquiring electrical service at a rate comparable to that of urban Americans

3. a. Economic value
   b. Electric appliance market
   c. Increased production
   d. Recreational areas

4. a. Dependable electrical service to cook, heat, cool, and do many chores which previously had to be done by hand
   b. Modern water and plumbing systems made possible by electric water pumps
   c. Communications through radio, television, phones, and citizen's band two-way radios
   d. Rural standard of living equal to that of urban dwellers

5. b, d, f

6. (NOTE: Any two of the following are acceptable.)
   a. Rural electric cooperative
   b. Municipal
   c. Investor-owned
   d. Federal- or state-owned

ORIENTATION TO REC
UNIT 1

TEST

NAME _____ SCORE _____

1. Match terms associated with rural electric cooperative orientation to the correct definition. Place the correct number in the blank.

_____a.	Utility owned by stockholders	1.	Rural Electric Cooperative (REC)
_____b.	Finance agency which serves as a banker and makes technical advice available but does not build, own, or operate any electrical facility	2.	Investor-owned electric utility
_____c.	Finance agency which provides supplemental financing for its member rural electric systems	3.	Rural Electrification Administration (REA)
_____d.	Private nonprofit corporation owned and operated by its consumer-members	4.	Cooperative Finance Corporation (CFC)
_____e.	Utility owned by the city it serves	5.	Federal- or state-owned utility
_____f.	Transmission and generation utility owned by the state or federal government	6.	Municipal electric utility

2. State the reason for establishing the Rural Electrification Administration.

_____

_____

3. Discuss the importance of rural electric cooperatives.

_____

_____

_____

May be photocopied for student use.

TEST

4. Describe the benefits of rural electric cooperatives to rural America.

_____

_____

_____

_____

_____

5. Select from a list the finance agencies which loan money to rural electric cooperatives. Place an "X" in front of the correct agencies.

_____a. Small Business Administration

_____b. Cooperative Finance Corporation

_____c. Grand River Dam Authority

_____d. Rural Electrification Administration

_____e. First National Bank and Trust

_____f. Banks for Cooperatives

6. List two types of electric utilities.

a. _____

b. _____

May be photocopied for student use.

INTRODUCTION TO POWER LINE TECHNICIAN'S TRAINING
UNIT 2

SUGGESTED ACTIVITIES

1. Suggested activities for instructor:

   - Provide student with objective sheet.
   - Provide student with information sheet.
   - Make transparency.
   - Discuss unit and specific objectives.
   - Discuss information sheet.
   - Give test.

2. Unit reference

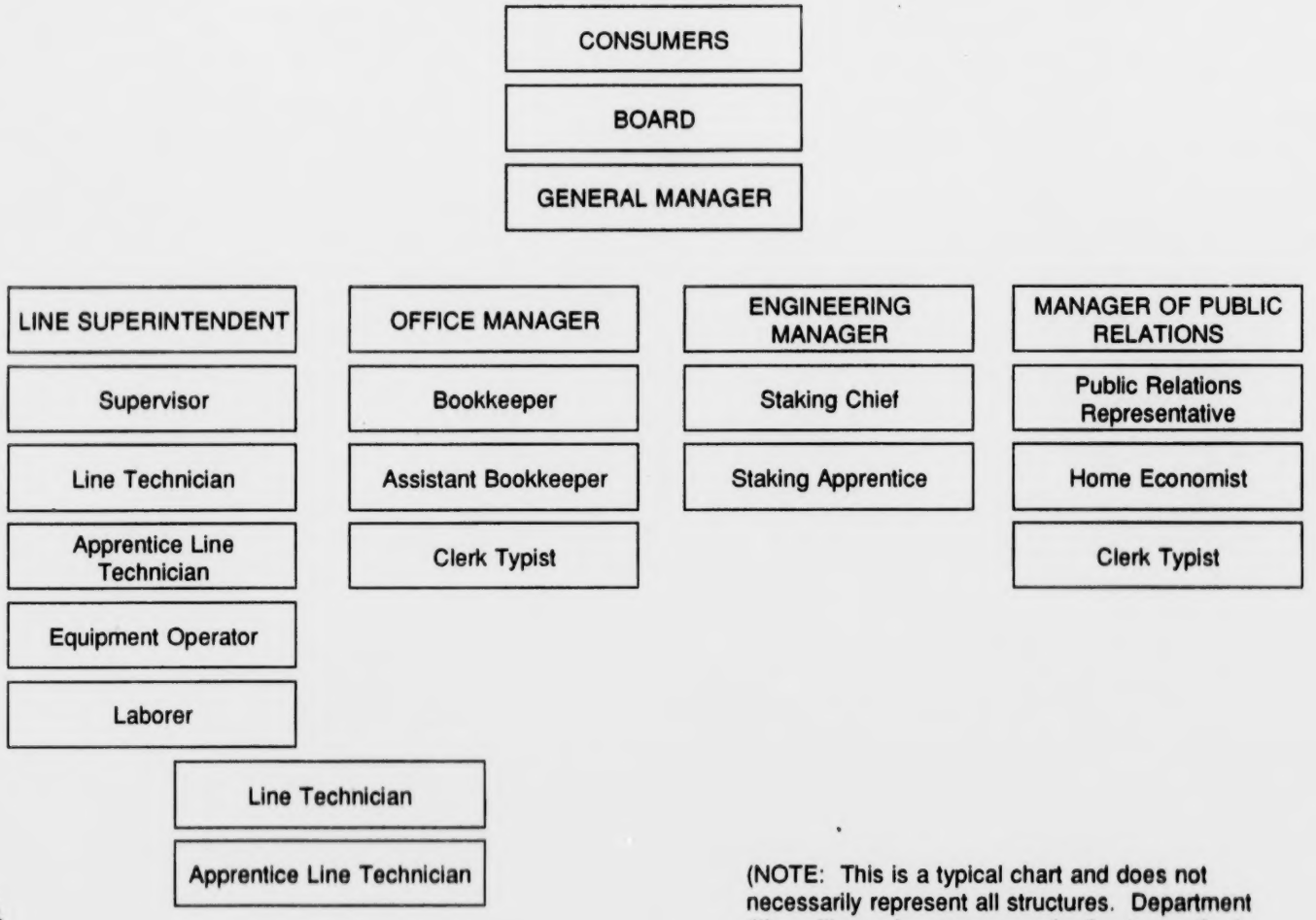
   - *Power Line Technician.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1978.

INTRODUCTION TO POWER LINE TECHNICIAN'S TRAINING
UNIT 2

ANSWERS TO TEST

1. a. Be active in the community
   b. Represent organization
   c. Contribute to community safety
2. a, b, d, e, f, h, i
3. b, d, e, f
4. (NOTE: Any three of the following are acceptable.)
   a. Construct new line
   b. Maintain existing line
   c. Retire line
   d. Recognize environmental concerns
   e. Research other departments
5. a, c, d, e, g, h
6. (NOTE: Any two of the following are acceptable.)
   a. Better qualifications
   b. More rapid advancement
   c. Greater employment opportunities

Organizational Chart



(NOTE: This is a typical chart and does not necessarily represent all structures. Department titles will vary from one organization to another)

May be photocopied for student use.

INTRODUCTION TO POWER LINE TECHNICIAN'S TRAINING
UNIT 2

TEST

NAME _____ SCORE _____

1. List three responsibilities of a line technician to the community.

   a. _____

   b. _____

   c. _____

2. Select from a list the responsibilities of a line technician to the employer. Place an "X" in the correct blanks.

   _____a. Reliability

   _____b. Loyalty

   _____c. Purchase of new equipment

   _____d. Promptness

   _____e. Assistance

   _____f. Interest

   _____g. Stockholder

   _____h. Neatness

   _____i. Safety

3. Select from a list information that is shown in on an organizational chart. Place an "X" in the correct blanks.

   _____a. Salary of all positions

   _____b. Relationship of each position to management

   _____c. Names of all personnel

   _____d. Reporting relationships

   _____e. Chain of command

May be photocopied for student use.

TEST

_____f. Relationship of each department to other departments

_____g. Relationship of management to directors

_____h. Relationship of directors to consumer

4. List three departmental functions of a line department.

a. _____

b. _____

c. _____

5. Select from a list topics taught in this course. Place an "X" in the correct blanks.

_____a. Personal and job safety

_____b. Small appliance repair

_____c. Fundamentals of electricity

_____d. Personal and radio communications

_____e. Line maintenance

_____f. Television repair

_____g. Mobile equipment

_____h. Insulators and insulation

6. List two benefits to students completing the line technician's training course.

a. _____

b. _____

May be photocopied for student use.

JOB ADVANCEMENT
UNIT 3

SUGGESTED ACTIVITIES

1. Suggested activities for instructor:

   - Provide student with objective sheet.
   - Provide student with information sheet.
   - Discuss unit and specific objectives.
   - Discuss information sheet.
   - Give test.

2. Unit references:

   - *Power Line Technician.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1978.

JOB ADVANCEMENT
UNIT 3

ANSWERS TO TEST

1. a. 4 e. 7
   b. 2 f. 1
   c. 3 g. 6
   d. 5

2. (NOTE: Any five of the following are acceptable.)
   a. Attitude
   b. Seniority
   c. Knowledge of present job
   d. Quality of work
   e. Quantity of work
   f. Initiative
   g. Perseverance
   h. Cooperativeness
   i. Goodwill
   j. Adaptability
   k. Ability to think
   l. Training

3. a. G f. P
   b. G g. P
   c. P h. G
   d. G i. G
   e. G j. P

ANSWERS TO TEST

4. a. Work safely
   b. Master present job completely
   c. Develop a program of self-improvement
   d. Show initiative on the job
5. a, c, d, e, f, g
6. a. Reading
      1) To improve general knowledge
      2) To improve communications
      3) To enlarge areas of interest
      4) To keep up-to-date in the field
   b. Joining professional organizations
   c. Being active in civic and community projects
7. (NOTE: Any four of the following are acceptable.)
   a. Unable to get along with co-workers
   b. Unskilled
   c. Irresponsible
   d. Not dependable
   e. No initiative
   f. Unsafe worker

JOB ADVANCEMENT
UNIT 3

TEST

NAME _____ SCORE _____

1. Match the terms on the right to the correct definitions.

_____a. Act of being a self-starter; finding things that need to be done without being told

_____b. Ability to work with others toward a desired goal

_____c. Feeling of rapport and respect that has been established between individuals

_____d. Action of following a job through to completion

_____e. Status attained by length of continuous service

_____f. Ability to adjust easily to new situations

_____g. Attainment of desired goals

1. Adaptability
2. Cooperativeness
3. Goodwill
4. Initiative
5. Perseverance
6. Success
7. Seniority

2. List five characteristics employers consider when making promotions.

a. _____

b. _____

c. _____

d. _____

e. _____

3. Distinguish between good and poor work attitudes by placing a "G" in front of the statements below that indicate good attitudes and a "P" in front of the statements that indicate poor attitudes.

_____a. Dependable

_____b. Sincere

_____c. Loafing

May be photocopied for student use.

TEST

_____d. Pride in job

_____e. Punctual

_____f. Gossiping

_____g. Sloppy work

_____h. Loyal

_____i. Cooperative

_____j. Using company time for personal activities

4. List four steps that will help in job advancement.

a. _____

b. _____

c. _____

d. _____

5. Select from the list below benefits of additional education and training by placing an "X" in the blanks.

_____a. Better pay

_____b. College degree

_____c. Prestige

_____d. Advancement and job stability

_____e. Personal satisfaction

_____f. More challenging position

_____g. Success

May be photocopied for student use.

TEST

6. Discuss three activities that will better prepare a person for advancement.

_____

_____

_____

_____

_____

7. List four reasons people do not succeed on the job.

a. _____

b. _____

c. _____

d. _____

May be photocopied for student use.

GENERAL SAFETY
UNIT 4

SUGGESTED ACTIVITIES

1. Suggested activities for instructor:

   - Provide student with objective sheet.
   - Provide student with information sheet.
   - Discuss unit and specific objectives.
   - Discuss information sheet.
   - Provide opportunity for each student to be certified in administering cardiopulmonary resuscitation and first aid.
   - Give test.

2. Unit references:

   - *First Aid, Responding to Emergencies.* American Red Cross, 1991.
   - *OSHA Compliance Encyclopedia.* OSHA Regulations, 1993 Business and Legal Reports, Inc. (ODA). "Medical and First Aid" 29 CFR 1910 Subpart K, Sections 1910.151 to 1910.153.
   - *OSHA Compliance Encyclopedia.* OSHA Regulations, 1993 Business and Legal Reports, Inc. (ODA). "Bloodborne Pathogens" 29 CFR Chapter XVII, Section 1910.1030.
   - *Power Line Technician.* Stillwater, OK: Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center, 1978.

GENERAL SAFETY
UNIT 4

ANSWERS TO TEST

1. a. Personal safety
   b. Safety of co-workers
   c. Safety of general public
   d. Familiarity with safety policy and rules
   e. Safe operation of equipment
2. a. First violation — reprimand by supervisor
   b. Second violation — Reprimand by general manager in presence of supervisor
   c. Third violation — Suspension without pay
   d. Fourth violation — Dismissal
3. a, b, c, e, f, g, i, j, k, l
4. a. Shows interest in safety for employees and public
   b. Establishes guidelines for safety program
5. a. General medical requirement
   b. First aid training
   c. Eye and body drenching or flushing
6. a. Activate the Emergency Medical System
   b. Take appropriate safety precautions
   c. Identify yourself as a person trained in first aid
   d. Get consent from victim to administer first aid
   e. Check airway
   f. Check breathing
   g. Check circulation

ANSWERS TO TEST

7. a. Open airway
   b. Restore breathing
   c. Restore circulation
   d. Control bleeding
8. a, b, d, e, f, h, i, j
9. a. Store in a weatherproof container
   b. Store container in a weatherproof location
   c. Inspect frequently

GENERAL SAFETY
UNIT 4

TEST

NAME _____ SCORE _____

1. State the safety responsibilities of an REC employee.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. List the four steps of discipline for safety rule violations.

   a. First violation _____

   b. Second violation _____

   c. Third violation _____

   d. Fourth violation _____

3. Select from the following list the items subject to safety rules by placing an "X" in the blanks provided.

   _____a. Equipment operation

   _____b. Maintenance

   _____c. Material handling

   _____d. Reporting

   _____e. Construction

   _____f. Use and care of tools

   _____g. Office work

   _____h. Typing

   _____i. Use and care of protective equipment

May be photocopied for student use.

TEST

_____j. Vehicle operation

_____k. Work procedures

_____l. Communications

4. State two reasons for the importance of a safety policy.

a. _____

b. _____

5. Discuss in a short paragraph the OSHA regulations for first aid.

_____

_____

_____

_____

6. List the seven basic steps for first aid.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

7. List the four steps of basic life support.

a. _____

b. _____

c. _____

d. _____

May be photocopied for student use.

TEST

8. Select from the following list the first aid supplies which should be included in a first aid kit.

_____a. Sterile gauze pads

_____b. Roller and triangular bandages

_____c. Paper and pencil

_____d. Adhesive bandages in assorted sizes

_____e. Scissors and tweezers

_____f. Ice bag or chemical ice pack

_____g. Sunscreen

_____h. Personal protective equipment

_____i. Flashlight with extra batteries

_____j. Waterless antiseptic wipes

9. List the three practices for care of first aid supplies.

a. _____

b. _____

c. _____

May be photocopied for student use.

A CIMC "RAINBOW PROGRAM"

FOR STANDARDS OF TEACHING EXCELLENCE

One very important factor contributing to higher student performance is the expectation of parents and teachers. Experience suggests that teachers and parents who expect student success find that students perform better, attend class more regularly, have positive attitudes, and stay in school longer. The students' success and confidence in their ability to learn may cause additional growth and behaviors that exert a positive influence throughout life.

STUDENT'S PROMISE

Let it be publicly known that students in this program have high expectations

I recognize that America's future is dependent on my success in school.
I will attend school regularly.
I will keep regular study hours at home.
I will read each day at home.
I will never accept failure.
I will accept responsibility for my school challenges.
I will respect the rights and feelings of others at home, school, and work.
I will develop positive qualities in myself that my friends will admire.
If I have difficulty, I will insist on help with my school work.
If I have difficulty, I will always try harder.
I will ask my teacher for clear learning objectives.
I will practice good citizenship skills at home, school, and work.
I will keep my parents/guardians informed daily about my school activities.
I will develop goals for school, home, and work.
I will seek advice from my teachers, parents/guardians, and counselors on career guidance.
I will constantly practice the skills of a good student.

CIMC

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BEST COPY AVAILABLE

Power Line Technician

Second Edition

Module A

- Orientation to REC
- Introduction to Power Line Technician's Training
- Job Advancement
- General Safety

BEST COPY AVAILABLE

CIMC

Student Workbook

Power Line Technician: Module A

Student Workbook

Developed by the
Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and Technical Education

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ORIENTATION TO REC
UNIT 1

UNIT OBJECTIVE

After completion of this unit, the student should be able to discuss the importance of rural electric cooperatives and describe how they benefit rural America. This knowledge will be evidenced by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with REC orientation to the correct definitions.
2. State the reason for establishing the Rural Electrification Administration.
3. Discuss the importance of rural electric cooperatives.
4. Describe the benefits of rural electric cooperatives to rural America.
5. Select from a list the finance agencies which loan money to rural electric cooperatives.
6. List types of electric utilities.

ORIENTATION TO REC
UNIT 1

INFORMATION SHEET

1. Match terms associated with (REC) Rural Electric Cooperation Orientation to the correct definitions.

   - Rural Electric Cooperative (REC) — Private nonprofit corporation owned and operated by its consumer-members
   - Rural Electrification Administration (REA) — Finance agency which serves as a banker and makes technical advice available but does not build, own, or operate any electrical facility
   - Cooperative Finance Corporation (CFC) — Finance agency which provides supplemental financing for its member rural electric systems
   - Investor-owned electric utility — Utility owned by stockholders
   - Municipal electric utility — Utility owned by the city it serves
   - Federal- or state-owned utility — Transmission and generation utility owned by the state or federal government

2. State the reason for establishing the Rural Electrification Administration

   - To assist rural Americans in acquiring electrical service at a rate comparable to that of urban Americans

3. Discuss the importance of rural electric cooperatives to rural America.

   - Economic value

     (NOTE: The electric cooperatives' multi-million dollar payroll has a positive impact in our nation.)

   - Electric appliance market

     (NOTE: A multi-million dollar sales market has been created by rural electricity.)

   - Increased production

     (NOTE: Electric-driven systems have significantly increased production in manufacturing and services.)

INFORMATION SHEET

- Recreational areas

  (NOTE: Electric cooperatives have provided the electricity needed in remote areas for lakeside cabins, park areas and good recreational sites.)

4. Describe the benefits of rural electric cooperatives to rural America.

   - Dependable electrical service to cook, heat, cool, and do many chores which previously had to be done by hand
   - Modern water and plumbing systems made possible by electric water pumps
   - Communications through radio, television, phones, and citizen's band two-way radios
   - Rural standard of living equal to that of urban dwellers

5 Select from a list the finance agencies which loan money to rural electric cooperatives.

   - Rural Electrification Administration
   - Cooperative Finance Corporation
   - Banks for Cooperatives

6. List types of electric utilities.

   - Rural electric cooperative
   - Municipal
   - Investor-owned
   - Federal- or state-owned

INTRODUCTION TO POWER LINE TECHNICIAN'S TRAINING
UNIT 2

UNIT OBJECTIVE

After completion of this unit, the student should be able to select from a list responsibilities of a line technician to the community and employer and list benefits from the line technician's training program. This knowledge will be evidenced by scoring eighty-five percent of the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. List responsibilities of a line technician to the community.
2. Select from a list the responsibilities of a line technician to the employer.
3. Select from a list information that is shown on an organizational chart.
4. List departmental functions of a line department.
5. Select from a list topics taught in this course.
6. List benefits to students who complete the line technician's training course.

INTRODUCTION TO POWER LINE TECHNICIAN'S TRAINING
UNIT 2

INFORMATION SHEET

1. List responsibilities of a line technician to the community.

   - Be active in the community
   - Represent organization

     (NOTE: The line technician is a representative of his/her organization to the community and should conduct himself/herself in a manner that is becoming to the employer on and off the job.)

   - Contribute to community safety

     (NOTE: Hazards such as downed power lines and trees in power lines shall be readily identified by line technician.)

2. Select from a list the responsibilities of a line technician to the employer.

   - Reliability

     (NOTE: A good working relationship between the line technician and the employer cannot exist if the line technician is not reliable.)

   - Loyalty
   - Interest

     (NOTE: The line technician shall show an interest in the job and the organization.)

   - Assistance

     (NOTE: Assistance is often needed by both the employer and the consumer and shall be given freely when needed.)

   - Promptness
   - Neatness

     (NOTE: Neatness and pride shall be shown in personal appearance by the line technician.)

   - Safety

INFORMATION SHEET

3. Select from a list information that is shown on an organizational chart. (Transparency 1)

   - Relationship of each position to management
   - Chain of command
   - Reporting relationships
   - Relationship of each department to other departments
   - Relationship of management to directors
   - Relationship of directors to consumer

4. List departmental functions of a line department.

   - Construct new line
   - Maintain existing line
   - Retire line

     (NOTE: The term *line* includes pole, hardware, and all electrical equipment used in line construction.)

   - Recognize environmental concerns
   - Research other departments

     (NOTE: The line department assists the engineering, public relations, and office departments.)

5. Select from a list topics taught in this course.

   - Safety
     1. Personal
     2. Job
   - Fundamentals of electricity
   - Equipment
     1. Hand tools
     2. Mobile
   - Insulators and insulation

INFORMATION SHEET

- Line work
    1. Overhead construction
    2. Underground construction
    3. Maintenance
- Communications
    1. Personal
    2. Radio
    3. Phone

6. List benefits to students who complete the line technician's training course.
    - Better qualifications
    - More rapid advancement
    - Greater employment opportunities

JOB ADVANCEMENT
UNIT 3

UNIT OBJECTIVE

After completion of this unit, the student should be able to list characteristics employers consider when making promotions and discuss steps that will help in job advancement. The student should be able to select from a list benefits of additional education and training and discuss activities that will better prepare a person for advancement. This knowledge will be evidenced by scoring 85 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms associated with job advancement to the correct definitions.
2. List characteristics employers consider when making promotions.
3. Distinguish between good and poor work attitudes.
4. List steps that will help in job advancement.
5. Select from a list benefits of additional education and training.
6. Discuss activities that will better prepare a person for advancement.
7. Discuss reasons people do not succeed on the job.

JOB ADVANCEMENT
UNIT 3

INFORMATION SHEET

1. Match terms associated with job advancement to the correct definitions.

   - Adaptability — Ability to adjust easily to new situations
   - Cooperativeness — Ability to work with others toward a desired goal
   - Goodwill — Feeling of rapport and respect that has been established between individuals
   - Initiative — Act of being a self-starter; finding things that need to be done without being told
   - Perseverance — Action of following a job through to completion
   - Seniority — Status attained by length of continuous service
   - Success — Attainment of desired goals

2. Characteristics employers consider when making promotions

   - Attitude
   - Seniority
   - Knowledge of present job
   - Quality of work
   - Quantity of work
   - Initiative
   - Perseverance
   - Cooperativeness
   - Goodwill
   - Adaptability
   - Ability to think
   - Training

   (NOTE: These characteristics are not listed in order of importance.)

INFORMATION SHEET

3. Distinguish between good and poor work attitudes.

   - Good
     1. Punctual
     2. Dependable
     3. Sincere
     4. Loyal
     5. Pride in job
     6. Cooperative
   - Poor
     1. Loafing
     2. Gossiping
     3. Using company time for personal activities
     4. Sloppy work
     5. Taking chances

4. List steps that will help in job advancement.

   - Work safely
   - Master present job completely

     (NOTE: Follow directions, ask questions when unsure, follow standard practices, check quality of work, and keep standards high.)
   - Develop a program of self-improvement

     (NOTE: This program should include improving your personality, increasing your skills, and continuing your education.)
   - Show initiative on the job

     (NOTE: Take on additional responsibility and suggest improvements.)

INFORMATION SHEET

5. Select from a list benefits of additional education and training.
   - Advancement and job stability
   - Better pay
   - More challenging position
   - Prestige
   - Personal satisfaction
   - Success
6. Discuss activities that will better prepare a person for advancement.
   - Reading
     1. To improve general knowledge
     2. To improve communications
     3. To enlarge areas of interest
     4. To keep up-to-date in the field
   - Joining professional organizations
   - Being active in civic and community projects
7. Reasons people do not succeed on the job
   - Unable to get along with co-workers
   - Unskilled
   - Irresponsible
   - Not dependable
   - No initiative
   - Unsafe worker

GENERAL SAFETY
UNIT 4

UNIT OBJECTIVE

After completion of this unit, the student should be able to state the safety responsibilities of an REC employee, select from a list items which are subject to safety rules, and discuss OSHA requirements for first aid. This knowledge will be evidenced by scoring 100 percent on the unit test.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. State the safety responsibilities of an REC employee.
2. List the steps of discipline for safety rule violations.
3. Select from a list items which are subject to safety rules.
4. State reasons for the importance of a safety policy.
5. Discuss OSHA regulations for first aid.
6. List the basic steps in first aid.
7. List steps of basic life support.
8. List first aid supplies
9. List the practices for care of first aid supplies

GENERAL SAFETY
UNIT 4

INFORMATION SHEET

1. State the safety responsibilities of an REC employee.

   - Personal safety
   - Safety of co-workers
   - Safety of general public
   - Familiarity with safety policy and rules
   - Safe operation of equipment

2. List the steps of discipline for safety rule violations.

   - First violation — Reprimand by supervisor
   - Second violation — Reprimand by general manager in presence of supervisor
   - Third violation — Suspension without pay
   - Fourth violation — Dismissal

   (NOTE: The preceding steps are recommended by the REA, but discipline may be more severe in some cooperatives.)

3. Items subject to safety rules

   - Vehicle operation
   - Equipment operation
   - Material handling
   - Use and care of tools
   - Use and care of protective equipment
   - Construction
   - Maintenance
   - Office work
   - Work procedures
   - Communications

INFORMATION SHEET

4. State reasons for the importance of a safety policy.

   - Shows interest in safety for employees and public
   - Establishes guidelines for safety program

5. Discuss OSHA regulations for first aid.

   - General medical requirement

     (NOTE: The employer shall insure the ready availability of medical personnel for advice and consultation on matters of plant health.)

   - First aid training

     (NOTE: In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. First aid supplies approved by the consulting physician shall be readily available.)

   - Eye and body drenching or flushing

     (NOTE: Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.)

6. List the basic steps for first aid.

   - Activate the Emergency Medical System

     (NOTE: Phone the local emergency number.)

   - Take appropriate safety precautions

     (NOTE: Ensure the safety of the victim, yourself, and bystanders.)

   - Identify yourself as a person trained in first aid
   - Get consent from victim to administer first aid

     (NOTE: Tell the victim who you are, your level of training and what it is you would like to do.)

   - Check airway
   - Check breathing
   - Check circulation

INFORMATION SHEET

7. List steps of basic life support.

- Open airway

  (NOTE: Use a personal protective equipment.)

- Restore breathing

- Restore circulation

  (NOTE: Maintain normal body temperature and elevate the victim's legs to keep blood circulating to the vital organs.)

- Control bleeding

  (NOTE: Use personal protective equipment.)

8. First aid supplies

- Sterile gauze pads

- Roller and triangular bandages

- Adhesive bandages in assorted sizes

- Scissors and tweezers

- Ice bag or chemical ice pack

- Personal Protective Equipment

  (NOTE: Such as but not limited to gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices.

  Personal protective equipment will be considered "appropriate" only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of which and for the duration of time which the protective equipment will be used.)

- Flashlight with extra batteries

  (NOTE: Should be stored in separate bag.)

- Waterless antiseptic wipes

INFORMATION SHEET

9. List the practices for care of first aid supplies.

   - Store in a weatherproof container
   - Store container in a weatherproof location
   - Inspect frequently

   (NOTE: Inspect enough to ensure that expended items are replaced at least once a year.)

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